

REMARKS

This is a full and timely response to the outstanding non-final Office Action mailed September 12, 2002. Reconsideration and allowance of the application and presently pending claims are respectfully requested.

I. Allowable Subject Matter

Applicants appreciate the Examiner's indication that claims 55, 57 and 58 would be allowable if rewritten to include all of the limitations of the base claim and any intervening claims.

In that it is believed that every rejection has been overcome, it is submitted that each of the claims that remains in the case is presently in condition for allowance.

II. Claim Rejections - 35 U.S.C. § 112

A. Rejections under 35 U.S.C. § 112, Second Paragraph

Claim 50 has been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as the invention. In particular, the Examiner states that the limitation "the protective semiconductor devices" lacks antecedent basis.

In response to these rejection, Applicants have amended claim 50 to depend from claim 49 instead of claim 47. Claim 50 as amended overcomes this rejection and is now in condition for allowance.

III. Claim Rejections - 35 U.S.C. § 102(b)

A. Statement of the Rejection

Claim 1 has been rejected under 35 U.S.C. § 102(b) as being anticipated by Goordman (“Goordman,” U.S. Pat. No. 3,530,391).

The rejection states that Goordman discloses Applicants’ invention as recited in the above-identified claim including first and second back-matching resistor networks. Applicants respectfully traverse this rejection.

B. Applicants’ Claimed Invention

Applicants’ claims describe an output stage for a line driver. As provided in independent claim 1, Applicants claim:

1. An output stage for a line driver, comprising:
 - a first amplifier comprising a series combination of a first semiconductor device and a second semiconductor device;
 - a second amplifier comprising a series combination of a third semiconductor device and a fourth semiconductor device;
 - a first integrated back-matching resistor network* interposed between the first and the second semiconductor devices; and
 - a second integrated back-matching resistor network* interposed between the third and fourth semiconductor devices.

(emphasis added)

Accordingly, Applicants’ claims define an output stage for a line drive which includes a pair of back-matching resistor networks. A back-matching resistor network comprises a resistor network between the driver’s output and the line. The sum of the output impedance of the driver and the resistor network value must equal the line

impedance. Using back-matching, only one-half the signal value appears on the line because of the voltage division between the line and the combination of the resistor network and the driver's impedance.

At the receiving end, the mismatch between the line impedance and the receiver's typically high input impedance causes a reflection of approximately the same voltage magnitude as the incident signal. The receiving device immediately sees the full voltage (the sum of the incident and reflected voltages), and the added signal propagates to the receiving end. However, no further reflections occur because the resistor network terminates the reflected wave at the driving end. Back-matching consumes less energy than other resistive types of termination, adds no DC load to the driver, and adds no extra impedance from the signal line to ground.

C. The Goordman Reference

Goordman discloses a temperature-compensated differential amplifier, which is a combination of two emitter-coupled differential amplifier stages arranged in a bridge configuration. In various embodiments the stages are coupled together using resistors, diodes, or batteries.

In contrast to Applicants' claimed invention, Goordman does not disclose, teach, or suggest an output stage of a line driver as presently recited in Applicants' claim 1. Regarding the coupling circuit using resistors (75, 76, 78, 79), Goordman describes them as voltage dropping paths or voltage dividers, **not** as resistors used for back-matching as described above. In fact, Goordman's use of other devices (diodes and batteries, see Figs. 2 & 3) in the coupling circuit in place of the resistors as voltage dropping paths, further demonstrates

that Goordman does not disclose, teach, or suggest the resistors (75, 76, 78, 79) as a back-matching resistor networks.

D. Discussion of the Rejection

It is axiomatic that “[a]nticipation requires the disclosure in a single prior art reference of *each element* of the claim under consideration.” W. L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 1554, 220 U.S.P.Q. 303, 313 (Fed. Cir. 1983)(emphasis added). Therefore, every claimed feature of the claimed invention must be represented in the applied reference to constitute a proper rejection under 35 U.S.C. § 102(b).

In the present case, not every feature of the claimed invention is represented in the Goordman reference. Goordman does not disclose an output stage for a line driver including back-matching resistor networks.

Due to this clear shortcoming of the Goordman reference, Applicants respectfully assert that Goordman does not anticipate independent claim 1. Therefore, Applicants respectfully request that the rejection of claim 1 be withdrawn.

IV. Claim Rejections - 35 U.S.C. § 103(a)

A. Rejection of Claims 2, 3, 47-49, 52-54, and 56

1. Statement of the Rejection

Claims 2, 3, 47-49, 52-54, and 56 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Goordman.

Regarding claims 2, 3, and 56, the rejection alleges that Goordman discloses Applicants' invention substantially as claimed with the exception of selecting resistance

values to match a desired expected input impedance. The rejection concludes, however, that it would have been obvious to a person having ordinary skill in the art to change values of the resistors in order for it to match the input impedance. Applicants respectfully traverse this rejection.

Regarding claims 47-49 and 52-54, the rejection alleges that Goordman discloses Applicants' invention substantially as claimed with the exception of swinging the output signal a voltage exceeds the maximum drain-source (FET) voltage of the circuit. The rejection concludes, however, that it would have been obvious to a person having ordinary skill in the art to increase the values of the resistors to maximize the output swing. Applicants respectfully traverse this rejection.

2. Applicants' Claimed Invention

Regarding claims 2, 3, and 56, Applicants' claims describe a line driver or a method of increasing the available signal transmit power on a transmission line. Each of these claims include a back-matched resistor or resistor network as described above in the discussion for claim 1.

Regarding claims 47-49 and 52-54, Applicants' claims describe a line driver, a transmission unit, a communications system, or a method of increasing the available signal transmit power on a transmission line. Each of the claims includes an output signal or transmit signal having a voltage swing that exceeds the maximum drain-source voltage of the integrated circuit technology of the line driver.

3. Discussion of the Rejection

As acknowledged by the Court of Appeals for the Federal Circuit, the U.S. Patent and Trademark Office (“USPTO”) has the burden under section 103 to establish a *prima facie* case of obviousness by showing some objective teaching in the prior art or generally available knowledge of one of ordinary skill in the art that would lead that individual to the claimed invention. See In re Fine, 837, F.2d 1071, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). Accordingly, to make a *prima facie* case for obviousness, there must be some prior art teaching or established knowledge that would suggest to a person having ordinary skill in the pertinent art to fill the voids apparent in the applied reference. It is respectfully asserted that no such *prima facie* case has been made in the outstanding Office Action.

Regarding claims 2, 3, and 56, the rejection alleges that it would have been obvious to a person having ordinary skill in the art to change values of the resistors (75, 76, 78, 79) in order for it to match the input impedance, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. Goordman discloses the use of resistors, diodes, or batteries to provide a voltage dropping or coupling circuit for the stages of a temperature-compensated differential amplifier. Therefore, the voltage drop across these resistors (or the other devices) is the main concern of Goordman and that is what would be optimized for the temperature compensation of the amplifier, and changing the values of the resistors (75, 76, 78, 79) of Goordman in order to match the input impedance would not have been obvious to a person having ordinary skill in the art. In addition, changing these resistor values would have the effect of changing the voltage levels throughout the differential amplifier (see Fig. 1).

Regarding claims 47-49 and 52-54, the rejection alleges that it would have been obvious to a person having ordinary skill in the art to increase the values of the resistors (75, 76, 78, 79) to maximize the output swing and that the desired swing level would be considered a matter of design choice in the absence of unexpected results. As described above, Goordman discloses the use of resistors, diodes, or batteries to provide a voltage dropping or coupling circuit for the stages of a temperature-compensated differential amplifier. Therefore, the voltage drop across these resistors (or the other devices) is the main concern of Goordman, and changing the values of the resistors (75, 76, 78, 79) of Goordman in order to maximize the output swing of the signal would not have been obvious to a person having ordinary skill in the art. In addition, increasing the swing level of the transmitted signal yields an increase in maximum power while sourcing the same maximum current. Thus, allowing standard line driver devices to meet the maximum power requirements for most xDSL applications.

In summary, it is Applicants' position that a *prima facie* case for obviousness has not been made against Applicants' claims 2, 3, 47-49, 52-55, 57, and 58. Therefore, it is respectfully submitted that each of these claims is patentable over Goordman and that the rejection of these claims should be withdrawn.

Furthermore, Applicant respectfully submits that claims 2 and 3 contain all features of their respective independent claim 1. Since independent claim 1 should be allowed, as argued above, pending dependent claims 2 and 3 should also be allowed as a matter of law for at least this reason.

CONCLUSION

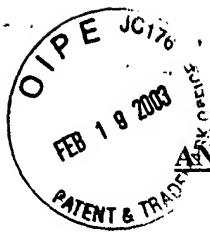
In light of the foregoing amendments and for at least the reasons set forth above, Applicants respectfully submit that all objections and/or rejections have been traversed, rendered moot, and/or accommodated, and that the now pending claims 1-3, 47-50, and 52-58 are in condition for allowance. Favorable reconsideration and allowance of the present application and all pending claims are hereby courteously requested. If, in the opinion of the Examiner, a telephonic conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (770) 933-9500.

Respectfully submitted,



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ANNOTATED VERSION OF MODIFIED CLAIMS TO SHOW CHANGES MADE

The following claims have been amended by deleting the bracketed ("[]") portions and adding the underlined ("__") portions.

50. (Once Amended) The line driver of claim [47] 49, wherein the protective semiconductor devices comprise at least one source follower.

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